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# PATENT

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# PATENT, UTILITY CERTIFICATE

Intellectual Property Code - Book VI

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## REQUEST FOR GRANT

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Reserved for the INPI		1. NAME AND ADDRESS OF THE APPLICANT OR THE REPRESENTATIVE TO WHOM THE CORRESPONDENCE IS TO BE ADDRESSED			
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2. APPLICATION		Nature of the industrial property right <input checked="" type="checkbox"/> patent <input type="checkbox"/> divisional application  → initial application  <input type="checkbox"/> utility certificate <input type="checkbox"/> conversion of a European patent application <input type="checkbox"/> patent	<input type="checkbox"/> deferred <input checked="" type="checkbox"/> immediate	date	Insert date here
Compilation of the search report		<input type="checkbox"/> yes <input type="checkbox"/> no			
The applicant, as a physical person, asks to pay the fee by instalments		<input type="checkbox"/> yes <input type="checkbox"/> no			
Title of the invention (maximum 200 characters)					
Digital television receiver/decoder device with interactive playing of a pre-recorded television program					
3. APPLICANT(S) SIREN No.		APE-NAF code	Legal form		
name and forenames (underline the surname) or company name DASSAULT AUTOMATISMES ET TELECOMMUNICATIONS		Société Anonyme			
nationality/nationalities French					
Full address(es)					
9, rue Elsa Triolet Z.I. des Gâtines 78373 - PLAISIR					
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4. INVENTOR(S) The inventors are the applicants		<input type="checkbox"/> yes <input checked="" type="checkbox"/> no	If the answer is no, provide a separate designation		
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Country of origin		Number	Filing date	Nature of the application	
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**DESIGNATION OF THE INVENTOR**  
(if the applicant is not the inventor or the sole inventor)

NATIONAL REGISTRATION NO.  
No. 99/06,957 of 2 June 1999

**TITLE OF THE INVENTION:**

Digital television receiver/decoder device with interactive playing of a pre-recorded television program.

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**NOTE:** In exceptional cases, the name of the inventor may be followed by that of the company to which he belongs (membership company) when the latter is other than the company which is the applicant or proprietor.

Date and signature(s) of the applicant(s) or of the representative

Paris, 5 October 1999  
Consultant No. 92-3040 (B) (M)

[illegible signature]

## **DOCUMENT CONTAINING AMENDMENTS**

\* A change made in the wording of the original claims, unless the change derives from the provisions of Article R.612-36 of the Intellectual Property Code, is indicated by the reference "R.M." (amended claims).

Digital-television receiver/decoder device with  
interactive playing of a pre-recorded television  
program.

The present invention relates to the field of digital television, and more particularly to interaction between a pre-recorded television program 10 and a chosen software application, such as an Internet application or the like.

It applies more particularly to remote teaching (distance learning), in which the software application comprises a chosen training course, intended to be 15 presented remotely to a user.

In digital television, the television signals are often broadcast via a predetermined communications medium (cable, satellite, radio channel, etc) so as to be received/decoded by an appropriate digital- 20 television receiver/decoder.

In general, such a receiver/decoder comprises:

- an input interface suitable for receiving digital-television signals originating from a predetermined broadcast network and for delivering a 25 digital stream of television signals;

- a demultiplexer/extractor module suitable for extracting, from the digital stream, digital sequences relating to a chosen television program; and

- a decoder module suitable for converting the 30 digital sequences thus extracted into television signals compatible with a visual-display module.

The applicant posed itself the problem of providing a receiver/decoder capable of recording a chosen digital-television program, in the absence of

the user if necessary, and of playing said recorded program, at the user's request, in interactive mode and in synchronism with a software application, for example a software application of Internet type or the like,  
5 for the purposes of distance learning or the like.

The present invention affords a solution to exactly this problem.

It relates to a digital-television receiver/decoder device of the abovementioned type.

10 According to one general definition of the invention, the receiver/decoder device further comprises:

- a digital-television program recording and replay module;

15 - a processing module suitable for implementing a software application able to contain initialization and marking information relating at least to the start and to the end of a chosen digital-television program, as well as to the reception/extraction of the digital  
20 sequences relating to said chosen television program, said processing module being suitable for receiving said initialization and marking information originating from the software application, and for comparing it with the television digital stream originating from the demultiplexer/extractor module, said processing module being suitable, moreover, in response to a positive comparison, for causing the recording of the digital sequences relating to said chosen television program as well as the initialization and marking information, in  
25 the record/replay module, and  
30

- an execution module suitable, at the request of a user, for launching the playing of the digital sequences relating to said television program thus recorded, in synchronism with the running of the

software application with the aid of initialization and marking information accompanying the television program thus recorded.

Thus, by virtue of the invention, it is not  
5 only possible to record a chosen digital-television  
program, in the absence of the user if need be, but  
above all to play said recorded program in interactive  
mode, at the request of the user, with a software  
application, of Internet type or the like, for the  
10 purposes of remote training, for example.

In practice, the execution module is suitable  
for launching the playing of the digital sequences  
relating to the chosen television program and the  
running of the software application on the same visual-  
15 display module.

According to one aspect of the invention, the  
receiver/decoder device comprises man/machine interface  
means, the actuation of which allows the user to  
interact simultaneously and in synchronism in the  
20 playing of the recorded television program and in the  
running of the Internet application.

According to one preferred embodiment of the  
invention, the receiver/decoder device comprises a  
communications module able to communicate with a remote  
25 server according to a predetermined, Internet-type  
communications protocol, said communications module  
being of the type comprising Internet processing means  
suitable for cooperating with memory-storage means able  
to store an Internet browser serving for browsing on  
30 the Internet and for downloading the software  
application onto said memory-storage means.

The Internet processing means are preferably  
suitable for cooperating with the visual-display module  
and the man/machine interface means.

According to another characteristic of the invention, the demultiplexer/extractor module is able to extract the initialization and marking information of the television program and to send it to the 5 Internet processing means so as, at the request of the user, to allow running of the Internet application in local mode and/or in cooperation with the remote server, in synchronism with the playing of the recorded television program.

10 According to yet another characteristic of the invention, the Internet processing means are suitable, in cooperation with the processing means of the receiver/decoder, for driving the record/replay module.

15 In practice, the Internet processing means are suitable for delivering, to the record/replay module, commands of the stop, pause, pause start, start, slow, fast forward, rewind, jump forward, jump back, etc, type.

According to another aspect of the invention, 20 the receiver/decoder device further comprises an image-composition module suitable for receiving the video images output by the decoder module as well as the graphics images output by the Internet processing means, so as to combine them according to a chosen 25 image-composition mode.

In practice, the image-composition mode is of overprint, multi-windowing, text, image-combining type. For example, the image-composition module comprises:

- a first memory suitable for containing the 30 video images output by the decoder module;
- a second memory suitable for containing the graphics information output by the Internet processing means;

- a third memory suitable for containing an image-composition program;

5 - image-processing means suitable for extracting the chosen information from the first and second memories depending on the composition program, so as to produce the composite images;

- a module for synchronization of the visual-display module, so as to synchronize the composition of images output by the two memories.

10 Advantageously, the receiver/decoder device comprises an interface of serial type and/or an interface of high-speed link type so as to connect peripheral equipment of the printer, video/camera system, audio suite or video peripheral type.

15 A further subject of the present invention is a method of digital-television processing implemented by the receiver/decoder device according to the invention.

20 Other characteristics and advantages of the invention will emerge in the light of the detailed description below and of the drawings, in which:

- Figure 1 diagrammatically represents the various elements of the receiver/decoder according to the invention;

25 - Figure 2 is a flow chart illustrating the recording of a chosen television program as well as the running, simultaneously and in synchronism with the playing, of this recorded program with a software application of Internet type according to the invention; and

30 - Figure 3 illustrates the composition of images from the digital stream emanating from the recorded television program and from the digital stream emanating from the software application according to the invention.

In a general way, the present description possesses drawing elements of a certain nature. That being so, these drawing elements may serve to give a better understanding of the description of the 5 invention and may also, as appropriate, contribute to the definition thereof.

The present invention applies to any digital-television signal broadcasting network. Thus it extends to a broadcasting network of the radio type as well as 10 of the satellite, cable, wire, microwave type or the like.

With reference to Figure 1, a digital-television receiver/decoder device 1 comprises an input interface 2 linked to an antenna 4 able to communicate 15 with a plurality of satellites (in the case of a satellite broadcast).

The input interface 2 comprises a tuner (not represented) which selects a desired channel from a chosen frequency range. This channel corresponds to a 20 television program for which the user has right of access. The signal at the output of the tuner is then demodulated coherently by passing through a demodulation stage (not represented).

In practice, the digital-image data stream 25 FMPEG coming from the input interface 2 is to the MPEG-2 or MPEG-4 (MOTION PICTURE EXPERTS GROUP) format, corresponding to a standard for compression of animated images. If required, as regards digital television, reference can be made to the book by Hervé BENOIT: 30 "Digital Television", Editions Dunod, Paris, 1998.

At the output from the demodulation stage, the FMPEG digital stream drives a demultiplexing unit 6 allowing selection, by means of chosen filters, of individual signal trains in the form of packets to the

MPEG-2 format, corresponding to the program chosen by the user.

Because of the broadcast mode used (satellite), which is subject to errors, the multiplex of the 5 individual MPEG-2 packets is here preferably of the "transport" type.

In the case of the communication of information which is subject to payment, the demultiplexing unit 6 is further combined with a descrambler module 8 which 10 undertakes the selection and the descrambling of the packets of the chosen television program. The descrambling module 8 comprises an access-control module able to cooperate with a memory 10 supplying a descrambling key for the attention of the processor 12 15 of the receiver/decoder.

In practice, the processor 12 carries on a dialog with the access-control module 8 by sending ECM ("Entitlement Control Message") or EMM ("Entitlement Management Message") conditional access messages, and 20 receives control messages CW.

The descrambled MPEG packets, output by the demultiplexing unit 6, are then applied to a decoding module 14 of MPEG type.

The digital signals output by the decoding 25 module 14 are converted back into analog signals by a video-encoding module 16 for the purposes of direct viewing on a visual-display module 18 or of video storage on an analog video recorder.

The digital signals output by the decoding 30 module 14 can also be routed to a digital video processing suite via a 1394-type high-speed digital link 17.

The processor 12 controls the links between modules, especially the modules 2, 6, 8, 10, 14, 16,

17. It interprets the commands originating from one or more remote controls 20, 21 (remote-control unit), 23 (infrared or radio frequency keypad), 25 (infrared touch terminal). It manages the memory-card reader 8 as  
5 well as the man/machine interfaces generally present, such as, for example, the display device 18, a serial link 22 of USB type to a computer or development station (not represented), the infrared or radio frequency input keyboard 23, a second interface to a  
10 reader 9 of a second memory card for other access rights, as appropriate.

The Applicant set itself the problem of combining, with such a receiver/decoder 1, new functions making it possible not only to record a  
15 chosen digital-television program, in the absence of the user as appropriate, but above all to play said recorded program in interactive mode, at the request of the user, with a software application, for example of Internet type or the like.

20 In general, in order to view the digital-television program broadcast by a digital-television broadcasting network (satellite, cable, etc), the presence of the user is required at the time of the broadcast. Otherwise, the program has to be recorded on  
25 appropriate equipment in order for the recording thus stored to be played later on.

However, at the present time, the recording of a digital-television program does not make it possible to make use of the interaction likely to be associated  
30 at the time of the initial broadcast of the digital-television program.

It results therefrom that a pre-recorded digital-television program is generally passive and prevents participation by the user in the case of

applications such as games, on-line purchasing, participative training, distance learning, remote training, etc.

The present invention especially remedies this  
5 drawback.

It makes it possible especially to associate a software application WEA, capable of being run in synchronism with the playing of the pre-recorded television program ST, so as to allow the active  
10 participation of the user.

The software application WEA is sent by a predetermined communications network, of the Internet type or the like. However, it is also possible to use a software application available on another medium such  
15 as a CD-ROM, DVD or the like.

Access to the Internet can be implemented according to land-based solutions (cable, switched telephone network, ADSL, meaning "asymmetric digital subscriber line") or according to solutions with  
20 satellites.

In the case of Internet access by satellite, the transmission of the Internet-type software application WEA in the direction from the operator/server toward the user can be included  
25 advantageously in the digital-television broadcasting channels.

In the case of Internet access by a land-based route, the transmission of the Internet-type software application WEA in the direction from the operator/server toward the user can also be transmitted with a communications medium separate from the  
30 broadcasting of the television program, for example using a wire link, via a modem 30.

The method of achieving synchronization of the television program ST with the Internet application WEA, which will be described in more detail below, is similar in the two types of transmission (satellite or 5 modem) of the Internet application WEA.

Very advantageously, the software application WEA is of the remote-training type in which cooperative work between the student and the instructor is necessary. This cooperative work is advantageously 10 capable of being put in place according to the invention by virtue of interaction between the television sequence ST obtained in broadcast mode (course of lectures), then recorded on an appropriate medium (hard disk), and personal work and evaluation of 15 the following of the training, available and implemented in a software application WEA.

Before broadcasting, the television sequence ST which will be recorded on a hard disk is first of all marked beforehand in terms of significant subsets in 20 the MPEG digital stream. The sequence indicators are synchronization points which specify the ranking of the subsets and which will thus allow the software application to be synchronous sub-sequence by sub-sequence.

25 The marking of the sequences which serves as an indicator to the interactive mode is carried out directly in the MPEG transmitted digital stream.

The marking can be carried out at the level of groups of images (GOP, meaning "Group Of Pictures") or 30 of reference compression images (I Picture). This marking, on transmission, uses coders/multiplexers which are configured to include the references in the MPEG-2 streams. On replay, or reception, a receiver/decoder device which is not equipped with the

interactive mode will visually display only the memory-stored sequences without interference from the markers.

In a variant, advantageously, the indicators put in place by the invention can use decoding-instant 5 indicators of an MPEG DTS (Decoding Time Stamp) access unit, or else PTS indicators, that is to say the indicators of the instant of presentation of a sound frame or of an MPEG-type decoded image.

By virtue of these indicators, it is not 10 necessary to alter the MPEG-2 stream. Thus, the standard MPEG-2 demultiplexers are capable of carrying out, in standard mode, the extractions of the indicators, like those of the PST type.

According to the invention, an extraction 15 module 50 is therefore provided, at the output from the demultiplexing module 6, suitable for extracting the abovementioned indicators, for example the indicators of the PST type.

According to the invention, an interpreter 20 module 52 is connected to the extraction module 50 in order to interpret the indicators thus extracted, according to the SI information system of the MPEG-2 digital-television standard.

The triggering of the recording requires 25 knowledge of the start instant of the television sequence or television program ST.

The user can program his recording request in several ways.

According to a first method, the recording 30 request is sent on the Internet from a program guide. The user makes his selection and requests recording. At the time of this request, the user's receiver/decoder communicates its identity (internal reference stored in memory in the receiver/decoder or in a control card).

The recording process therefore follows the following stages:

- 1) identification of the receiver/decoder,
- 2) choice of the television sequence ST,
- 5       3) memory-storage of the choice of the sequence ST
- 4) sending of a start code,
- 5) recording on hard disk 40, and
- 6) end of recording.

10       The television sequence ST to be recorded is sent in the television stream according to the programming from the broadcasting center. Before the sending of the television sequence ST, a predetermined routine makes it possible to start the recording in the 15 receiver/decoder. This routine repeats the start code and the identification code mentioned above. The recording is terminated by a stop code associated with the identification of the receiver/decoder.

20       Another method, possibly simpler in terms of control, consists in receiving, from the Internet (via a wire connection and a modem), as a result of a request similar to that of the abovementioned method, an identification code for the start of the television sequence ST and for the end of the television sequence 25 ST.

The receiver/decoder waits to identify the start of the sequence ST following the code being received and records until reception of the end of sequence ST.

30       In practice, each television sequence ST is identified and sent without reference to the users.

Furthermore, the sequence-start and sequence-end codes are capable of being security-protected by a

user-identification code (operator card or identification card for the receiver/decoder).

Another embodiment consists in using the tables indicating the start of an event, tables called EIT (Event Information Table) tables.

These tables transmit information to the users. This information especially includes the type of program as well as its eventual broadcast, that is to say "to come in a few moments" or "in progress".

Another solution consists in identifying the sequence ST by an external or internal means so as to pre-program this identification into the receiver/decoder device according to the invention.

Thus, for example, in a general course program, the device according to the invention awaits identification of the sequence ST, in clear or scrambled, in order to make the recording.

The starting of the playing of the television program ST, recorded in accordance with the recording mode described above, takes place at the request of the user. As from the start of the playing of the television program ST, the receiver/decoder connects to the application WEA. It is the recognition of the identification of the television program ST which allows starting of the application WEA. The interaction between the application WEA and television program ST is achieved by virtue of the recognition of the markers in the MPEG stream.

When the software application WEA is broadcast on the same medium as the television digital stream, the input interface and the demodulation stage can be common. The digital stream for the software application WEA is then presented under a coding similar to that of the FMPEG television stream and the television

sequences ST are dissociated from the sequences relating to the software application WEA, the transmission volumes for the video sequences being much longer than the interactive sequences related to the  
5 software application WEA.

In a variant, an Internet demodulator can be placed in parallel with the television demodulator, and the receiver/decoder possesses two channel-demodulation devices and a single access to the transmitted medium.  
10 It should be noted that the Internet mode can be independent of the MPEG 2 coding. It should also be noted that this embodiment can be simplified in the case in which the Internet coding is carried out in the same multiplex, for example IN-BAND mode.

15 When the television stream and the Internet stream originate from two different media (Figure 1), the Internet mode may, for example, use the switched telephone network or digital telephone network (ISDN). Under these conditions, the Internet system comprises  
20 its own modem 30 and an IP (Internet Protocol)-communications-protocol processing suite.

In the two types of connection, the transport-demultiplexing system sends information to the Internet system so as to allow the execution of the Internet commands relating to the various markers of the recorded sequence ST.  
25

It should be noted that the Internet application WEA or the course can easily be replayed since the interactive aspect is related to the recorded  
30 television sequence ST.

For the same broadcast of a television sequence ST by the TV broadcasting channel, it may correspond to different teaching actions [sic]. Thus, for the same

size of the TV channel, different levels can be associated in the training.

The correct level of the training can be put into action by an Internet application adapted to the 5 Internet, for example the protocol "WWW" or the protocol "HTTP".

It is thus possible, for example, to distinguish level-0 training where no training is really being offered, the TV program is received 10 directly and viewed by television viewers who are therefore passive.

At an elementary level, the sequences ST can be checked so as to verify the instantaneous comprehension by the user.

15 At a medium level, the content of the television sequences ST can be validated and participation can be proposed in the comprehension of the training, for example in the form of questions/answers.

20 At a higher level, provision can be made to attach exercises with references to other learning and an evaluation of the learning.

Finally, at the advanced level, provision is made to attach sequences for deepening and evaluating 25 the level of comprehension and of absorption of the content.

An expert mode can be associated with each level of training, in which a consultation can be set up with an expert intended to intervene in the progress 30 of the teaching sequence (remote-presence mode).

The expert may intervene at his own request, because of the monitoring of the progress of the training at the program level in the broadcast center or server.

The intervention by the expert may, in contrast, intervene at the request of the user who wishes to have direct instructor contact.

The expert mode may be of the message type or  
5 by direct dialogue with a message of the on-line e-mail type, or by a video-type mode (video telephone, videoconferencing).

In expert mode, the management of the consultation must be carried out between the expert and  
10 the user. The establishing of the consultation makes it necessary to determine the instant of connection to the Internet and the running of the training program.

The user, for his training, may know nothing of the hierarchical levels. He follows a training sequence  
15 which indicates to him the elements of the television program as well as the elements of the Internet application which will be executed.

The choice of the training can be made according to several types.

20 When the choice is voluntary, the user can look up a catalog on the Internet or consult a training sequence to be followed. In contrast, if the choice is imposed, the training sequence is imposed either on an Internet reference or supplied on a card of the bank  
25 card type which gives the Internet processor the elements for making the request for the recording markers.

With reference to Figure 1, the receiver/decoder device according to the invention  
30 comprises, for the Internet connection, Internet processing means 60 providing the link according to the Internet protocol IP and software storage means 62 allowing browsing on the Internet. The Internet device

is in accordance with the specifications of the W3C and incorporates a JAVA virtual machine.

The receiver/decoder device according to the invention is functionally equivalent to an Internet browser and, by downloading, receives this Internet application (IP stream, meaning "Internet protocol" stream), providing local functioning (software module of the applet/Java type).

In on-line operation with the Internet, the receiver/decoder device according to the invention is standard Internet equipment using the visual-display module 18 and the keyboard 21 of the receiver/decoder device.

With reference to Figure 2, the various functionality aspects of the receiver/decoder device according to the invention have been described.

First of all, a stage E1 is provided for initialization of the recording of the television sequence ST. This initialization stage consists in making available information coming from the training program or Internet application making it possible to program the recording function as well as the information for directly starting the training program, via the Internet.

The Internet application WEA, via the Internet (IP stream), gives the information for the recording.

This information especially comprises the markers of the transport function for the individual packets to the MPEG-2 format, for recognition of the start and of the end of the television program ST.

This information also comprises the information on setting of the tuning function of the receiver/decoder (choice of the channel, frequency, transmission parameters).

Finally, the information for setting up the dish is also indicated. This information particularly relates to the positioning of the multiplex (satellite, polarization, etc).

5 At the end of the initialization stage E1, the receiver/decoder device possesses all the elements for starting the recording of the MPEG stream corresponding to the television sequence ST as from recognition of the start marker in the MPEG transport stream.

10 The receiver/decoder according to the invention has to be active so that the identification of the start marker launches the memory-storage or recording on the hard disk 40 (stage E2).

15 The file comprising the television sequence ST can be identified by a symbolic name which, at the moment when the television program ST is run, will make it possible to identify the correct file.

20 A naming system makes it possible to store several files; the number of memory-stored files is a function of the capacity of the hard disk 40. The capacity of the disk may be several gigabytes.

25 In order to make this function effective, it is advantageous for the information for initialization of the recording to contain the length of the file which will be broadcast. The length makes it possible to verify that the hard disk will allow complete recording of the corresponding sequence.

30 The information for making the recording is stored in memory within the receiving system. The Internet circuits are set for reception of the television sequence ST to be stored. These settings especially relate to the spatial setting as well as the reception setting.

The interpreter module 52 awaits recognition of the identification markers of the MPEG stream relating to the television sequence ST. As soon as the markers are recognized, the function of recording the stream ST on the disk 40 is carried out. This recording is made in transport mode, that is to say that all the markers of the information system SI necessary for the reproduction and the management of the digital-television signal are stored in memory.

The MPEG video/audio stream included in the transport mode is either recorded, in clear mode, after descrambling by the conditional-access system. Under these conditions, the reproduction or playing of the recorded file will take place directly on the basis of the video/audio stream thus recorded after descrambling.

The recording can also be made in scrambled mode. The recording then makes it necessary, for replay, to have available the active descrambling system and to have available rights of use of the television sequence. This recording then makes it possible to monitor the playing of the television sequence ST.

Recording takes place in the form of a file which possesses, as reference, the name given to the television sequence ST by the Internet application WEA via the Internet at the moment of the initialization.

The simultaneous and synchronous running of the application WEA and of the television sequence ST is launched at the request of the user (stage E3).

In practice, the Internet application WEA is driven by the application which is located on the Internet server and corresponding Internet application

loaded in the receiver/decoder in the course of the abovementioned initialization phase.

The user, at the moment of the launching of the Internet application WEA, is connected to the Internet site and the television sequence ST is initialized at 5 the sequence start, in the mode for playing from the hard disk.

The Internet application WEA indicates the sequence of active markers so that the reference points 10 of the television sequence ST are sent via the MPEG SI interpreter to the Internet processor 60 in order to take decisions on the running of the application WEA and of the playing of the sequence ST. These decisions may be an action by the local Internet application or 15 an action by the Internet application on the remote server.

The Internet processing module 60 may, if appropriate, take control of the recording module 40 on the basis of individual commands which may be as 20 follows:

- stop mode: the video is stopped and the sound is or is not stopped (placing of the recording/replay module 40 on standby);

- pause mode: temporary stopping of the sequence ST which resumes via the start command. The image is fixed, the sound is stopped, in forward or backspace mode by a calculated step;

- pause start mode: the restarting of the television sequence (video/audio) ST as from the point 30 where it was paused;

- start mode: the resumption of the video/audio combination from the stop point is similar to the pause-start, but follows stopping;

- slow mode: the progression of the movements is slowed;

- acceleration mode: the movements of the video are accelerated;

5 - fast or slow rewind mode: go backward with movement only on the images;

10 - jump forward: the advancing of the sequence ST is carried out without video so that, in the course of the training cycle, the sequence ST can go to a defined sub-program. This function requires the use of the transport markers;

- jump backward: backward jump by the video sequence, able to be set to the image counter by virtue of the marker.

15 It should be noted that the functions of the recording/replay module 40, with the exception of the jumps, are accessible directly by the user by way of a remote control 25. The information is then sent to the recording module 40 and to the Internet application WEA  
20 for synchronization of the two streams (television sequence ST and Internet application WEA).

The execution stage E3 comprises the following sub-stages:

25 - running (playing) of the recorded television sequence ST (stage E5);

- monitoring of the television sequence ST via the interface relating to the recording module 40;

- detection of the action markers of the Internet application WEA;

30 - running of the software application (stage E4) WEA in internal mode with synchronization of the recording/replay module 40;

- if appropriate, running of the software application remotely via the Internet module in order to synchronize the recording module 40;
  - sending, to the Internet processor 60, of the information relating to the coexistence of the two streams, FMPEG and FIP (the two streams comprise video images originating from the recording/replay module 40 and the graphics images originating from the Internet processor 60).
- The global control information makes it possible to combine the images originating from the two sources ST and WEA. This method of combination may be of the multi-windowing type, overprinting of different layers, printing, for example, of the image relating to the television sequence ST on one layer and of the image relating to the Internet WEA on another layer.
- The combining can also be carried out in text mode. The pointing, by one of the man/machine pointing interfaces (remote control, keyboard, touch terminal) can be carried out by manipulation on the fields or regions of the screen of the visual-display module 18.
- The handling of the image and of the sound is undertaken by synchronization between the television sequence ST coming from the recording/replay module 40 and the graphical representations produced by the training programs WEA.
- Representations should allow coexistence between the two sources of information handled by the Internet application and the on-the-spot action from the man/machine interfaces (remote control, keyboard, touch terminal).

The method of combining the images should allow a teaching-oriented visual display of the information. This visual display can be effected by windowing, in

which the images are imbricated image-in-image with one of the images being overlaid onto the other, each image possibly being an animated image. Windowing can also be carried out with one image related to another image,  
5 the screen associating the two images in two contiguous windows.

The combining can be carried out by overprinting, in which the various layers are superimposed. Each point of each layer being  
10 characterized and stored in memory, as well as the overprinting conditions.

Certain layers may have characteristics which are globally unique; others, in contrast, may have individual definitions.

15 For example, layer No. 1 comprises video images coming from the recording module 40, while layer No. 2 comprises video images with a text overlaid, for example the subtitle relating to the television sequence ST.

20 Layer No. 3 may be a graphics layer coming from the Internet application WEA. The next layer No. 4 may be a graphics-handling layer.

Finally, layer No. 5 may comprise a layer of fixed images which is pre-recorded in the recording  
25 module or in the Internet application.

The man/machine interfaces or Internet terminals may be mobile terminals which are used by the user in the course of handling operations relating to the running of the training programs.

30 The remote control unit may allow the user to set up monitoring of the television aspect. The remote control unit possesses a set of functions some of which may have actions on the progress of the Internet application.

The remote control unit may be equivalent to a digital-television remote control.

A keyboard of the infrared or radio frequency type may make it possible to offer an infrared link  
5 between the receiver/decoder device and the keyboard. This type of keyboard makes it possible to insert alphanumeric codes and thus allows words to be compiled. Such a keyboard is easier to handle than a conventional remote-control unit for forming words.

10 The man/machine interface may also be a touch terminal of the "drawing terminal" type, comprising a region for drawing by contact. This terminal is also equipped with an infrared link.

15 The decoder/receiver device according to the invention may comprise several peripheral connections, especially connections by infrared links, serial-type digital links such as the USB bus, and 1394-type high-throughput, high-speed digital links, for example for the large-volume, high-throughput video and data  
20 streams.

The infrared link is advantageously used for the remote-control unit, for the keyboard and for the touch terminal. The terminal can be equipped with a USB serial interface making it possible to connect  
25 peripheral equipment in order to undertake supplementary functions, such as a printer, video-camera system or audio suite.

30 The connection of a digital camera via the USB link makes it possible to enhance the transmission to the Internet server and especially the connection with the expert.

The connection of an audio system makes it possible to reproduce sounds in supplement to the audio system which equips the apparatus.

The supplementary USB system makes it possible to work with the expert, for example, without going through the visual-display module. USB equipment of the handling-system, mechanical-robot type, makes it 5 possible to supplement the installation. These devices operate, in USB interface mode, under the control of a communications protocol of the IP, standing for "Internet Protocol", type.

It should be noted that the signals arising 10 from the processing of the information originating from the digital television system and from the Internet processing are formatted for final visual display and can then be forwarded to a high-speed external or internal network by way of a digital processing module 15 in connection with the 1394-type link.

Advantageously, video links can be formed by the 1394 link able to send streams at fast throughputs of the order of 200 to 400 Mb/sec. The video signal thus sent may be the television signal received and 20 forwarded in transport mode to a digital television recorder. In this case, the receiving function is identical to that of the video recording but it can be performed on the pre-recorded signal in the storage module so as thus to constitute a subsequent copy of 25 the television sequence ST.

The video signal may also be the combined television ST/Internet WEA signal, as it is visually displayed on the visual-display module. The composite image is resynchronized so as to be made compatible 30 with the video recorder or an external transfer device.

The composite signal results from the combination of the various internal sources into a single signal which is that sent to the visual-display module.

This composite signal is the combination of the digital stream ST and of the digital stream WEA in the case of animated sequences, as well as of the stream of pre-recorded fixed images which is stored in memory in  
5 the memory-storage means 62.

The text of the composite image may originate from the digital stream ST in MPEG format or else from the Internet application WEA in the IP format. The information arising from the user via the access  
10 peripherals of the man/machine interfaces are also capable of participating in the composition of this composite signal.

Finally, information capable of being calculated or processed by the local program WEA of the  
15 Internet processing are also capable of participating in the composition of this composite signal.

The processor 12 of the decoder/receiver participates in the implementing of the composite signal on the basis of the set of information arising  
20 from the television program ST or from the Internet application WEA.

The processor 12 undertakes the formatting of the signals from the sources, the geographical positioning of the images to be visually displayed, the  
25 positioning in space (superimposition) of the sources, as well as any animation thereof.

A dimensional management of the windows or of the superimpositions thereof is also implemented.

The image-composition module is an intelligent  
30 module produced on the basis of a graphics component which carries out all the operations of dimensioning, positioning and processing which are necessary for devising the final image.

The part for image synchronization to the format of the visual-display module is also undertaken by the image-composition module.

With reference to Figure 3, the composite-image-composition module 16 comprises a memory 100 suitable for storing the digital television stream ST originating from the decoding module 14, and a memory 102 suitable for storing the digital stream coming from the Internet module 60/62.

10       The memory 100 is intended for reduced processing operations, since the image is entirely formatted in the module of the decoder 14 (MPEG format).

15       A memory 104 is provided in order to contain the composite-image-composition program.

20       A graphics processor 106, under the control of the composition program, processes the various items of information arising from the memories 100 and 102, as well as from local sources 108, so as to compose a native composite image 110.

A synchronization module 112 makes it possible to synchronize the exact composition of the video/audio signal 120 of the visual-display module 18 or of the high-throughput video link 17.

## Claims

1. A digital-television receiver/decoder device of the type comprising:
  - 5 - an input interface (2) suitable for receiving digital-television signals originating from a predetermined broadcast network and for delivering a digital stream of television signals (FMPEG);
    - a demultiplexer/extractor module (6, 50)
  - 10 suitable for extracting, from the digital stream (FMPEG), digital sequences relating to a chosen television program (ST); and
    - a decoder module (14) suitable for converting the digital sequences thus extracted into television
  - 15 signals compatible with a visual-display module, characterized in that it further comprises:
    - a module (40) for recording and playing digital sequences of digital-television programs;
    - a processing module suitable for implementing
  - 20 a software application (WEA) able to contain initialization and marking information relating at least to the start and to the end of a chosen digital-television program, as well as to the reception/extraction of the digital sequences relating
  - 25 to said chosen television program, said processing module being suitable for receiving said initialization and marking information originating from the software application, and for comparing it with the television digital stream (FMPEG) originating from the
  - 30 demultiplexer/extractor module, said processing module being suitable, moreover, in response to a positive comparison, for causing the recording of the digital sequences relating to said chosen television program (ST) as well as the initialization and marking
  - 35 information, in the record/replay module (40), and

5            - an execution module suitable, at the request  
of a user, for launching the playing of the digital  
sequences relating to said television program (ST) thus  
recorded, in synchronism with the running of the  
software application (WEA) with the aid of  
initialization and marking information accompanying the  
television program (ST) thus recorded.

10          2. The device as claimed in Claim 1, characterized  
in that the execution module is suitable for launching  
the playing of the digital sequences relating to the  
chosen television program and the running of the  
software application on the same visual-display module  
(18).

15          3. The device as claimed in Claim 1, characterized  
in that it further comprises man/machine interface  
means (20, 21, 23, 25), the actuation of which allows  
the user to interact simultaneously and in synchronism  
in the playing of the recorded television program (SM)  
[sic] and in the running of the Internet application  
20         (WEA).

25          4. The device as claimed in Claim 1, characterized  
in that it further comprises a communications module  
(30) able to communicate with a remote server according  
to an Internet-type or similar communications protocol,  
the communications module being of the type comprising  
Internet processing means (60) suitable for cooperating  
with memory-storage means (62) able to store an  
Internet browser serving for browsing on the Internet  
and for downloading the software application (WEA) onto  
30         said memory-storage means (62).

35          5. The device as claimed in Claim 4, characterized  
in that the Internet processing means (60) are suitable  
for cooperating with the visual-display module (18) as  
well as the man/machine interface means of the  
receiver/decoder device.

6. The device as claimed in Claim 5, characterized in that the demultiplexer/extractor module (6, 50, 52) is able to extract the initialization and marking information of the television program and to send it to  
5 the Internet processing means (60) so as, at the request of the user, to allow running of the Internet application (WEA) in local mode and/or in cooperation with the remote server, in synchronism with the playing of the recorded television program.
- 10 7. The device as claimed in Claim 5, characterized in that the Internet processing means (60) are suitable, in cooperation with the processing means (12) of the receiver/decoder, for driving the record/replay module (40).
- 15 8. The device as claimed in Claim 7, characterized in that the Internet processing means (60) are suitable for delivering, to the record/replay module (40), commands of the stop, pause, pause start, start, slow, fast forward, rewind, jump forward, jump back, etc,  
20 type.
9. The device as claimed in one of the preceding claims, characterized in that it further comprises an image-composition module (16) suitable for receiving the video images output by the decoder module (14) as  
25 well as the graphics images output by the Internet processing means (60), so as to combine same according to a chosen image-composition mode.
10. The device as claimed in Claim 9, characterized in that the image-composition mode is of overprint,  
30 multi-windowing, text, image-combining type.
11. The device as claimed in Claim 9, characterized in that the image-composition module (16) comprises:  
- a first memory (100) suitable for containing the video images output by the decoder module (14);

- a second memory (102) suitable for containing the graphics information output by the Internet processing means (60, 19);

5        - a third memory (104) suitable for containing an image-composition program;

          - image-processing means (106) suitable for extracting the chosen information from the first and second memories depending on the composition program, so as to produce the composite images;

10      - a module (112) for synchronization of the visual-display module (18), so as to synchronize the composition of images output by the two memories.

12.     The device as claimed in one of the preceding claims, characterized in that it comprises an interface of serial type and/or an interface of link at the [sic] throughput type so as to connect peripheral equipment of the printer, video/camera system, audio suite or video peripheral type.

13.     A method of processing digital-television signals of the type comprising the following stages:

          - a) receiving digital-television signals originating from a predetermined broadcast network and delivering a digital stream of television signals (FMPEG);

25      - b) extracting, from the digital stream (FMPEG), digital sequences relating to a chosen television program (ST); and

30      - c) converting the digital sequences thus extracted into television signals compatible with a visual-display module, characterized in that it further comprises the following stages:

35      - d) implementing a software application able to contain initialization and marking information relating at least to the start and to the end of a chosen digital-television program, as well as to the

reception/extraction of the digital sequences relating to said chosen television program;

5        - e) receiving said initialization and marking information originating from the software application, and comparing it with the television digital stream (FMPEG) originating from the demultiplexer/extractor module;

10      - f) in response to a positive comparison, causing the recording of the digital sequences relating to said chosen television program (ST) as well as the initialization and marking information, in the record/replay module (40), and

15      - at the request of a user, launching the playing of the digital sequences relating to said television program (ST) thus recorded, in synchronism with the running of the software application (WEA) with the aid of initialization and marking information accompanying the television program (ST) thus recorded.

20      (30 [French] pages)      [signature]

CABINET NETTER

Claims.

1. Digital-television receiver/decoder device of  
the type comprising:
  - 5 - an input interface (2) suitable for receiving digital-television signals originating from a predetermined broadcast network and for delivering a digital stream of television signals (FMPEG);
  - a demultiplexer/extractor module (6, 50)
  - 10 suitable for extracting, from the digital stream (FMPEG), digital sequences relating to a chosen television program (ST); and
  - a decoder module (14) suitable for converting the digital sequences thus extracted into television signals compatible with a visual-display module (18),
  - a module (40) for recording and playing digital sequences of digital-television programs(ST);
  - a processing module suitable for receiving initialization and marking information relating at least to the start and to the end of a chosen television program, as well as to the reception/extraction of the digital sequences relating to said television program, and for comparing it with the television digital stream (FMPEG) originating from the demultiplexer/extractor module, said processing module being suitable, moreover, in response to a positive comparison, for causing the recording of the digital sequences relating to said chosen television program (ST) as well as the initialization and marking information, in the record/replay module (40), and
  - 25 - an execution module suitable, at the request of a user, for launching the playing of the digital sequences relating to said television program (ST) thus

- recorded, in synchronism with the initialization and marking information, characterized in that it further comprises a supplementary processing module (60) able to run a predetermined software application (WEA)
- 5 further containing said initialization and marking information, the software application (WEA) being run in synchronism and in interactive mode with the playing of the digital-television program thus recorded with the aid of said initialization and marking information.
- 10 2. The device as claimed in Claim 1, characterized in that the supplementary processing module (60) consists of Internet-type processing means suitable for cooperating with memory-storage means (62) able to store an Internet browser serving for Internet
- 15 browsing, and in that the receiver/decoder device further comprises a communications module (30) able to communicate with a remote server according to an Internet-type communications protocol or the like.
3. The device as claimed in Claim 2, characterized in that the communications module (30) is able to download the software application (WEA) originating from the remote server.
- 20 4. The device as claimed in Claim 1, characterized in that it comprises a media player able to read a data medium containing the software application (WEA).
- 25 5. The device as claimed in Claim 1, characterized in that it comprises means suitable for receiving the software application (WEA) with the digital-television stream.
- 30 6. The device as claimed in any one of Claims 1 to 5, characterized in that the execution module is suitable for launching the playing of the digital sequences relating to the chosen television program and

the running of the software application (WEA) on the same visual-display module (18).

7. The device as claimed in any one of Claims 1 to 6, characterized in that it further comprises  
5 man/machine interface means (20, 21, 23, 25), the actuation of which allows the user to interact simultaneously and in synchronism in the playing of the recorded television program (SM) [sic] and in the running of the Internet application (WEA).

10 8. The device as claimed in Claims 2 or 3 and 7, characterized in that the Internet processing means (60) are suitable for cooperating with the visual-  
display module (18) as well as the man/machine interface means of the receiver/decoder device.

15 9. The device as claimed in Claim 8, characterized in that the demultiplexer/extractor module (6, 50, 52) is able to extract the initialization and marking information of the television program and to send it to the Internet processing means (60) so as, at the  
20 request of the user, to allow running of the Internet application (WEA) in local mode and/or in cooperation with the remote server, in synchronism with the playing of the recorded television program.

10. The device as claimed in Claim 2, characterized  
25 in that the Internet processing means (60) are suitable, in cooperation with the processing means (12) of the receiver/decoder, for driving the record/replay module (40).

11. The device as claimed in Claim 10,  
30 characterized in that the Internet processing means (60) are suitable for delivering, to the record/replay module (40), commands of the stop, pause, pause start,

start, slow, fast forward, rewind, jump forward, jump back, etc, type.

12. The device as claimed in one of the preceding claims, characterized in that it further comprises an 5 image-composition module (16) suitable for receiving the video images output by the decoder module (14) as well as the graphics images output by the Internet processing means (60), so as to combine same according to a chosen image-composition mode.

10 13. The device as claimed in Claim 12, characterized in that the image-composition mode is of overprint, multi-windowing, text, image-combining type.

14. The device as claimed in Claim 12, characterized in that the image-composition module (16) 15 comprises:

- a first memory (100) suitable for containing the video images output by the decoder module (14);

- a second memory (102) suitable for containing the graphics information output by the Internet 20 processing means (60, 19);

- a third memory (104) suitable for containing an image-composition program;

- image-processing means (106) suitable for extracting the chosen information from the first and 25 second memories depending on the composition program, so as to produce the composite images;

- a module (112) for synchronization of the visual-display module (18), so as to synchronize the composition of images output by the two memories.

30 15. The device as claimed in one of the preceding claims, characterized in that it comprises an interface of serial type and/or an interface of high-throughput link type so as to connect peripheral equipment of the

printer, video/camera system, audio suite or video peripheral type.

16. A method of processing digital-television signals of the type comprising the following stages:

5 - a) receiving digital-television signals originating from a predetermined broadcast network and delivering a digital stream of television signals (FMPEG);

10 - b) extracting, from the digital stream (FMPEG), digital sequences relating to a chosen television program (ST); and

- c) converting the digital sequences thus extracted into television signals compatible with a visual-display module,

15 - d) receiving initialization and marking information relating at least to the start and to the end of a chosen television program, as well as to the reception/extraction of the digital sequences relating to said chosen television program, and comparing it 20 with the television digital stream (FMPEG) originating from the demultiplexer/extractor module;

25 - e) in response to a positive comparison, causing the recording of the digital sequences relating to said chosen television program (ST) as well as the initialization and marking information, in the record/replay module (40), and

- f) at the request of a user, launching the playing of the digital sequences relating to said television program (ST) thus recorded, characterized in 30 that it further comprises a prior step of implementing a software application (WEA) able to contain, in addition, said initialization and marking information, and in that the playing step f) is run in synchronism

and in interactive mode with the running of the software application (WEA) with the aid of the initialization and marking information.

17. A software product for a digital-television receiver/decoder device, of the type comprising initialization and marking information relating at least to the start and to the end of a chosen digital-television program, as well as to the reception/extraction of the digital sequences relating 10 to said chosen television program, said initialization and marking information being intended to be compared with a television digital stream, and, in the event of a positive comparison, said software product being able to cause the recording of the digital sequences 15 relating to said chosen television program as well as the initialization and marking information, characterized in that said initialization and marking information is contained in a software application (WEA) capable of being run in synchronism and in 20 interactive mode with the playing of the digital-television program thus recorded with the aid of the initialization and marking information.

18. The software product as claimed in Claim 17, characterized in that the software application (WEA) is 25 capable of being run on-line with a remote server.

19. The software product as claimed in Claim 17, characterized in that the software application (WEA) is capable of being contained on a data medium, and/or distributed by downloading.

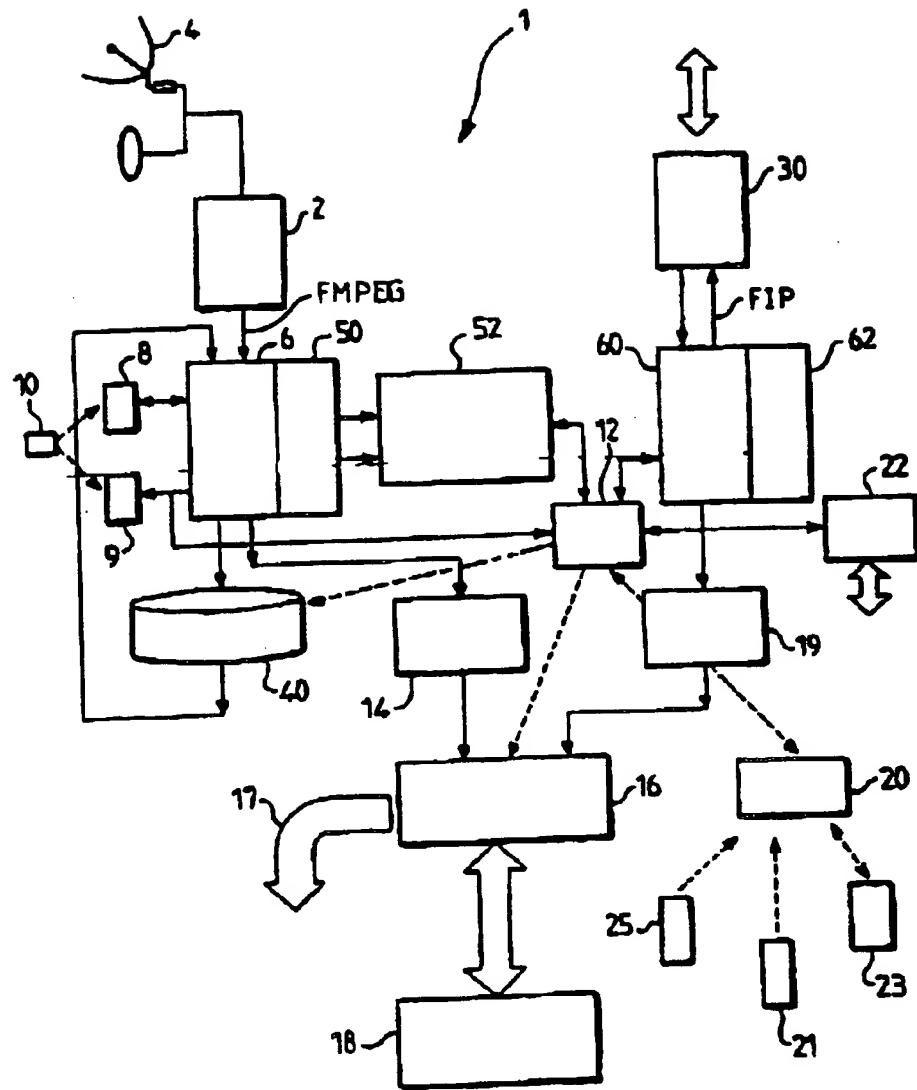


FIG.1

2/3

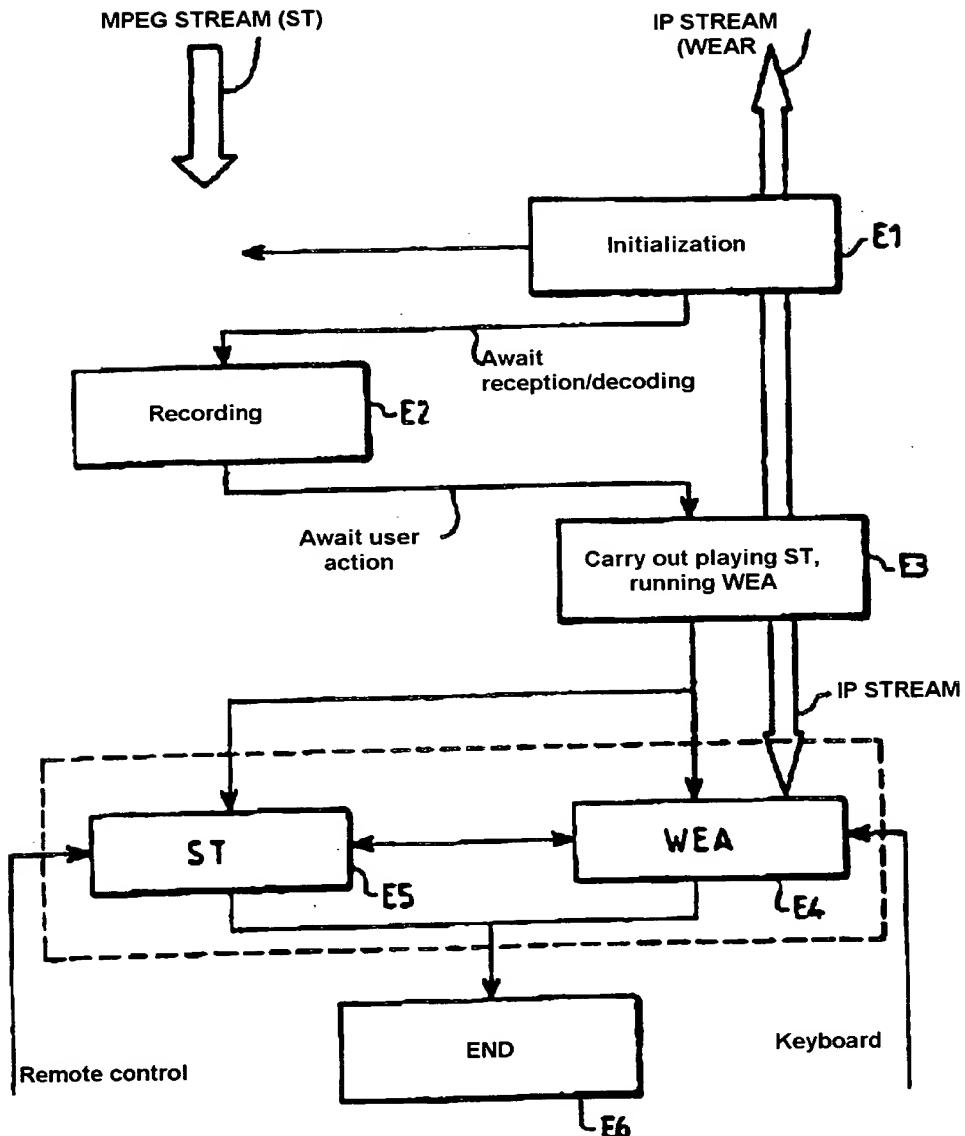


FIG.2

3/3

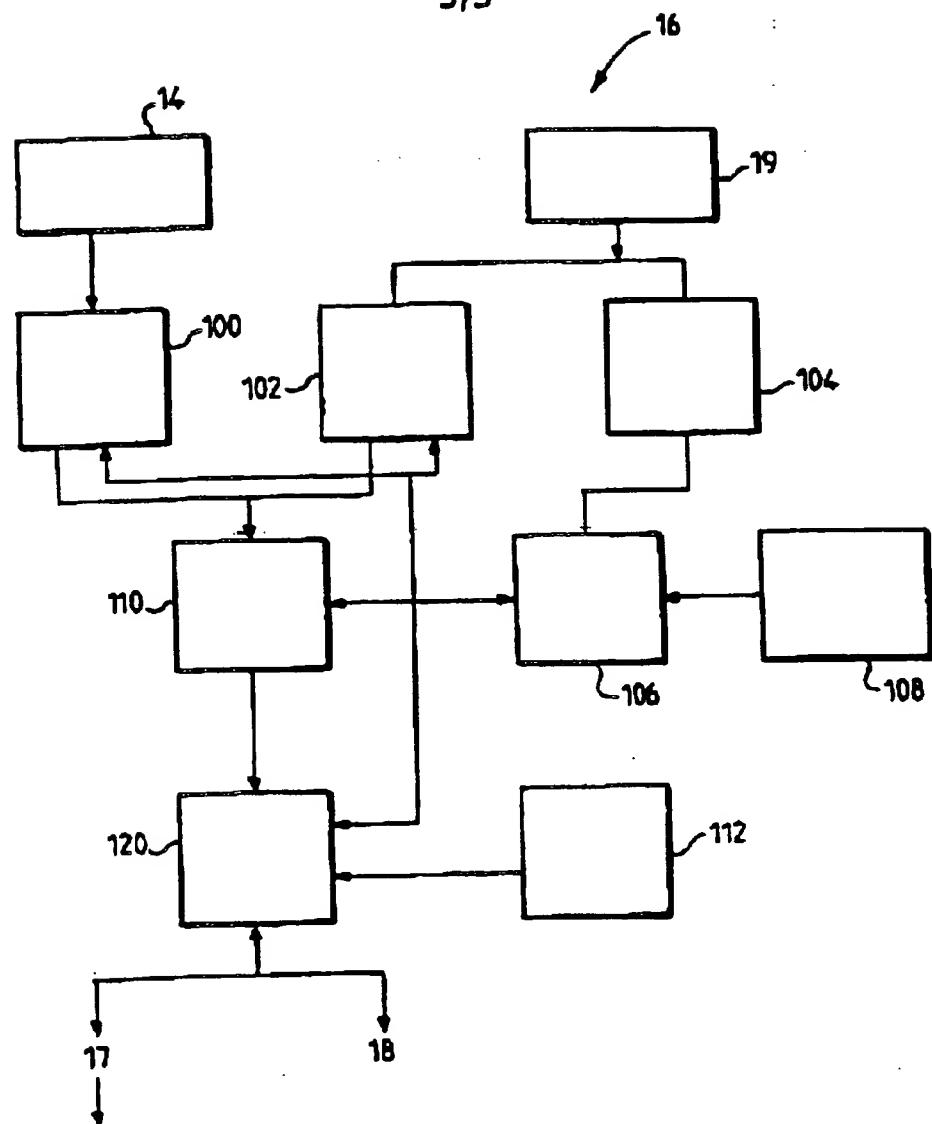


FIG. 3